

## BIBLIOGRAPHICAL NOTICE.

*The Penycuik Experiments.* By J. C. EWART, M.D., F.R.S., Regius Professor of Natural History, University of Edinburgh. (A. & C. Black.) 8vo. London, 1899. Pp. xciii, 177, with 46 illustrations distributed through text, process, mostly from photographs.

UNFORTUNATELY the title of this volume appears to be defective or misleading, and probably ought to have read '*Penycuik Equine Experiments.*' The author may be surprised one day, should he find it in some library catalogues classed under currency-question subjects—for such things, and even stranger ones, not unfrequently happen. The binding of the book may save this contingency, for its zebrine style is strikingly characteristic. Once for all, we may say the illustrations are very effective (especially those of the foals and of the heads), showing the body, legs, and face-markings. At first we thought the repetition of a few of the figures was a mistake; but careful study of the text has led us to a different conclusion.

The somewhat long introduction (93 pages) is devoted to a consideration of zebra hybrids generally, to the principles of breeding of various domestic animals, to telegony (=infection), to saturation (=absorption of some of the elements or nature of parentage), and to sterility in equine hybrids. Then follows Part I., containing:—  
A. The birth of a hybrid between a Burchell's zebra and a mare;  
B. The zebra-horse hybrids.

Part II. enters into a more detailed or specific account of telegony, with observations on the striping of zebras and horses and on reversion in the Equidæ. An appendix to the latter deals chiefly with letters and observations of others on telegonal experimental breeding, and it ends with remarks on the desirability of trial of some fifteen different sorts of crosses between the horse tribe, cattle, sheep, and swine.

A considerable portion of the contents of this book has at various intervals appeared as contributions to '*The Veterinarian,*' and one paper in '*The Zoologist,*' besides lectures delivered at the Royal Institution. To a certain section of the public then it is not entirely new matter; but as collected in one handy illustrated volume it will be much more accessible to naturalists and the general public, many of the latter now taking a deep interest in this and cognate subjects.

So far as we can judge, we believe we are in approximate agreement with the quintessence of Prof. Ewart's volume, namely, his views on Reversion; yet at the same time we may own to at first having been bewildered by the reiteration of data and the same differently expressed. This leads us to think that, instead of reprinting the separate papers previously published in journals, and endeavouring to connect them together by a general introduction, the author himself saying "which must also serve as a preface and, to a certain extent, as a supplement," it would have enhanced the work if it had been entirely recast into a continuous whole. But

then condensation implies labour, and in the end does not look so much. The literary style is both easy and popular.

Prof. Ewart's experiments on crossing members of the Equidæ commenced in the beginning of 1895 at Penycuik, Midlothian, Scotland, where he set up a small stud-farm. His first cross-breed was between a male Burchell's zebra (*E. Burchellii*, var. *Chapmani*) and a female black-coloured West Highland pony. From them was derived a young male hybrid ("Romulus"). This has the united characters of both parents, though different from both and not mule-like. The neck and head are of zebra-form, the body and limbs more resemble those of the horse, though the hoofs are zebrine. The body-colour shortly after birth showed up chiefly as bright golden yellow, with rich dark brown stripes.

According to Ewart the stripes and other markings bear more resemblance to those of the Somali zebra (*E. Grevyi*) than to Burchell's species. Before many months the colt began to shed its coat and afterwards to darken in tint, and this has increased in density. In temper, though ordinarily quiet, yet at times he is as easily excited, restless, and startled when seeing strange objects as is his sire the zebra. He carries himself proudly and with as daunt a step and dignity as the zebra.

The second cross was between an Irish mare, a bay with black points, and the above Burchell's zebra. The foal (a male, named "Remus") is much lighter in colour than "Romulus," to wit a rich light bay. The plan of the striping of this second hybrid is similar to the first, the bands of a dark reddish hue. Before long the mane assumed a somewhat erect attitude. As it shed its coat some months after birth, this was renewed by a thicker bay and brown inner one and an outer longer stronger-haired fringe. All four limbs have warts (chestnuts). Curiosity has been the chief feature in this animal as a foal.

The third hybrid was a cross between the same male Burchell's zebra and a Clydesdale mare—a bay with black points, white forehead, heavy mane and tail, and plenty of hair at the fetlocks. At birth this female hybrid ("Brenda") was much like an ordinary bay foal; but shortly after faint indistinct striping began to appear, though even afterwards not strongly marked. The right hind leg wart is wanting in this animal. Brow-arches, as in the other hybrids, do not round, but are more pointed, as in a Norwegian pony and a quagga at Amsterdam. The banding of the neck and body generally agrees with the stripes of the male hybrid no. 1, though less pronounced and with a tendency to shadow-stripes. Heavily built, with mule-like ears and tail, she is, so to say, a high-stepper in action.

Prof. Ewart's fourth zebrine hybrid (a female) is the product of a black female Shetland pony, and, as he states it, "is more of the zebra than any of my other hybrids." The body is of a leathery dun shade, partly reddish brown, with nearly black stripes, and there are stripes, not spots, across the loins and croup, with brow-arches as in no. 1 hybrid. The hoofs are longer than in

the zebra, and warts are deficient on the hind legs; the mane is short and upright in summer, long and pendent in winter. This fourth hybrid ("Norette") has been more intelligent than the others and quieter in disposition; her appearance is quaint, with an old-fashioned bygone-age look.

The fifth hybrid ("Heckla") is the produce of a skewbald Iceland pony. The dam has much white about her, and with a pale yellow body-tint. The experimenter expected the female offspring would be nearly as light in body-tint as the male Burchell's zebra parent; but, instead, this foal is the darkest of all the zebrine hybrids. Her coat is heavy, though she agrees in the main in build and markings with no. 1 hybrid ("Romulus"). Her action is freer, though more like that of a hackney than a zebra.

Some of the above dams were afterwards put to horses, and this second progeny receives full description from the author, part of which is referred to under telegony. The above five hybrids and other cross-breeds, along with further experiments on pigeons, fowls, rabbits, and dogs by the author, and references and comparisons with the labours of others in the field of hybrid produce, form the basis of the general introduction and of the chapter more particularly devoted to Telegony and Reversion among the Equidæ.

We need hardly make special reference to the chapter on "The Principles of Breeding" in the General Introduction, as some of the data again crop up when the transmission of characters is discussed. We may note *en passant* that in allusion to the third-week embryotic condition of the horse, when it becomes a bent-double fish-like creature, he says "the tail is bilobed like that of a mermaid, manatee"—surely a slip of the pen for dugong? (see Ryder, Develop. of Cetacea, Rep. U.S. Fisheries for 1885).

With regard to the fascinating doctrine of Infection of the Germ-plasm—Weismann's Telegony—Prof. Ewart speaks pretty strongly from his own experiments and others' investigation of the subject. He says:—"The result, so far, is that the evidence in support of undoubted 'infection' having even occurred is most unsatisfactory. In every case investigated the supposed infection could be accounted for by the relatively simple reversion hypothesis. . . . I do not by any means say telegony is impossible, that it never has occurred in the past and never will occur in the future; but I think I am justified in saying 'infection' has never been experimentally produced, and that the kind of 'infection' so widely believed in by breeders, if not impossible, is at least extremely improbable." He goes on to mention the oft-quoted Lord Morton's mare, which Ewart does not believe was infected by the quagga, and he gives figures and argument thereon.

Ewart further refers to his own experiments, and describes foals subsequently got from the several dams (*supra*) by horses after their having had foals by Burchell's zebra. These did not support the telegony hypothesis. As a climax he says, "I am now satisfied that [ordinary] foals are far more often marked with stripes—apparent or real—than is generally supposed."

The above views strongly support those held by Settegast \*, Weismann †, Kuhu ‡, Nathusius §, as well as some authorities in this country ||, though it is opposed to Herbert Spencer ¶, Dr. Harvey of Aberdeen \*\*, and others' explanation of the phenomenon.

Nor does the "Saturation" hypothesis find any more favour with Prof. Ewart. He quotes Bruce Lowe's definition †† of it, that at "each mating and bearing the dam absorbs some of the nature or actual circulation of the yet unborn foal, until she eventually becomes saturated with the sire's nature or blood, as the case may be." Prof. Ewart proceeds to show from others' and his own experiments that supposititious cases of saturation are but more pronounced ones of reversion, due to better nutrition of the germ-cells &c. .

Concerning sterility in equine hybrids, he thinks it is not in obedience to any natural law they are so. His experiments lead him to believe that preferential mating accounts for much, especially in the horse tribe; while it is noteworthy that a number of species of other animals and plants yield when crossed fertile offspring.

Prof. Ewart enters into detail, and nicely figures the peculiarities and differences of the so-called species of zebras and hybrids. He considers the Somali zebra (*E. Grevyi*) the most primitive form. This with the mountain zebra (*E. zebra*) and the group of Burchell's zebras are to him distinct types, but they cannot be readily distinguished from each other by their markings. Therefore we may add that Mr. R. I. Pocock's excellent paper on "The Species and Subspecies of Zebras" (Ann. & Mag. Nat. Hist. xx. 1897) may well be studied for comparison, this author's presumed subspecies being well defined. He notes the gradual lessening of the stripes from north to south, being absent in the hindquarters of the quagga south of the Orange River. See also Sir W. Flower's remarks ('The Horse,' 1891) and P. L. Selater's various memoranda on zebra species (P. Z. S.).

The question is started by Prof. Ewart, Were the ancestors of the horse striped? And as side-issues thereon he discusses the points as to face and head, neck, body, and leg-stripes. He concludes that the ancestral horse was striped in a manner intermediate between the common and Somali zebras. The croup- and rump-stripes he regards as comparatively a recent acquisition in the zebras. He suggests though that in pigs spots, and not dark bands, were the original coloration, these afterwards merging into stripes &c.

\* 'Die Thierzucht,' Band i.

† 'The Germ-Plasm: a Theory of Heredity.' English translation by Prof. W. N. Parker.

‡ An experienced veterinarian of Halle, quoted by Weismann and Ewart.

§ 'Ueber Shorthorn Rindvieh,' &c.

|| See works of Darwin, Romanes, Galton, &c.

¶ 'Contemporary Review,' 1893, &c.

\*\* A remarkable effect of cross-breeding quoted by Ewart.

†† 'Breeding on the Figure System,' quoted by Ewart.

We might instance the tapirs, swine, and some deer (all branches of the early trunk of the Ungulata), which in their youthful stages exhibit spotting, which afterwards is relatively effaced with increasing age.

Respecting Atavism, or Apparent Reversion, in the Equidæ, he refers to the ancestral dentition, to the five-toed ancestor, to occasional instances of cleft hoof, to at times a complete ulna in recent horses, as taking after the prototype of ancient equine forms. He instances *Protohippus* and *Hipparion*, the former as the ancestor of the breeds of horses, the latter as common ancestor of asses and zebras, without giving any decided data thereon\*.

Reference is made to Mr. Bateson's † limits of reversion getting credit for things sufficiently accounted for by variation. Nevertheless, Prof. Ewart says:—"The heredity problem is sufficiently difficult as it is, but if we are debarred from invoking the assistance of the reversion hypothesis, it will become hopelessly incomprehensible."

In substance he most justly observes that preponderance is given to the colour of the dermal system in experiments as bearing on reversion, while habits and general structure only occupy the background. Notwithstanding this cautious advice the author himself has fallen into the trap, though he has endeavoured to relieve the situation by sundry brief notes on the tempers and habits of some of his hybrids. But the fact is, coloration, and especially zebrine stripes, can be reasonably compared, whereas temperament and, necessarily, habits are physiological factors of uncertain value on which to base comparison.

To sum up: whatever the ultimate result of Prof. Ewart's experiments, it would seem as if we had advanced a short stage in the matter of Telegony and Reversion, though some of his deductions doubtless will be questioned. The researches so far are still in the initial stage, but they are a stimulus, and it is to be hoped may be further pursued. Finally, where is the index?—a marked omission in this volume—for the brief table of contents does not help much where direct references on special points are needed.

#### MISCELLANEOUS.

*On Ecdysis in Insects, considered as a means of Defence against Animal or Vegetable Parasites.—Special Rôles of the Tracheal and Intestinal Ecdyses.* By J. KÜNCKEL D'HERCULAIS.

By the experiments made by us in Algeria for the purpose of endeavouring to infect young Acridians (migratory locusts) by means of spores of the fungus that we discovered upon the adults—the

\* For an excellent epitome of 'The Horse,' his ancestors and living relations, clothed in most popular language, commend us to Flower's volume, with its reference to the palæontological and other literature of the Equidæ. Tegetmeier and Sutherland's 'Horses, Asses, Zebras, and Mules, and Mule Breeding' (1895) may also be profitably consulted.

† See his 'Materials for the Study of Variation,' 1894.